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now
the essence of knowledge

Using the Foundations and Trends LaTeX Macros

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Abstract

This document describes how to prepare a LaTeX document written using the standard article or book format in the format required for a Foundations and Trends journal. You should view the PDF output (this document, `sample.pdf`) along with the LaTeX source code (`sample.tex`) that created it to get the full picture.

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1

Introduction

1.1 Obtaining the required files

You will need the following four files: `now.cls`, `frontmatter.tex`, `now_logo.eps`, and `essence_logo.eps`. You can get the set for your journal from the NOW website and they should be placed into the directory with your LaTeX source. The `frontmatter.tex` file is specific to each journal; in this sample we use the frontmatter appropriate for *Foundations and Trends in Optimization*.

1.2 Preparing the LaTeX source

Once you have obtained the required files as described in §1.1, you need to prepare your LaTeX source. If you have written vanilla LaTeX source, it should be easy to convert to NOW format; this process is described in detail in Chapter 2. You can then typeset your source as usual [Lamport, 1994] using `pdflatex` (or `latex` and `dvipdf`) and `bibtex`.

2

Converting Your LaTeX Source

The NOW style files follow standard LaTeX constructions as much as possible and are based on LaTeX's `book` class, so if you are starting with a good LaTeX file, it should be very easy to convert to NOW format.

You can refer to a bare bones document outline in Appendix A. To convert your article to a NOW book, do the following:

1. If your paper currently uses the class `article`, convert all `\section`s to `\chapter`s, `\subsection`s to `\section`s, and `\subsubsection`s to `\subsection`s.

2. Insert `\frontmatter`, `\mainmatter`, and `\backmatter` commands at the locations shown in Appendix A. These are from the `book` class, so you may only need to do this if you are starting with an `article`.

3. Remove the following packages: `amsthm`, `caption`, `emptypage`, `fancyhdr`, `fontenc`, `fullpage`, `geometry`, `graphicx`, `lastpage`, `lmodern`, `multicol`, and `url`. They are incompatible with the class `book`, interfere with or modify the output style, or are already included.

4. Remove any commands that modify anything to do with the page size, spacing, fonts, pagination, or anything else related to the general display of the document. For example, remove any `\clearpage` or `\newpage` commands. Similarly, remove any custom formatting or definitions for theorem, lemma, definition, and similar environments. The `amsthm` package is already included with definitions for environments described in §B.1.

5. Ensure the paper's abstract is defined in an `abstract` environment and placed *after* the `mainmatter` command, as shown in Appendix A.

6. Change the document class to

   ```
   \documentclass{now}
   ```

   to produce the book version or

   ```
   \documentclass[openany]{now}
   ```

   to produce the journal version of the paper.

7. Optionally, include an `acknowledgements` or `acknowledgments` environment (either spelling works) after the final main chapter but before any appendices, as shown in Appendix A.

8. Optionally, include any of the following commands as needed:

   ```
   \volume{1}
   \issue{3}
   \pubyear{2013}
   \copyrightyear{2013}
   \isbn{XXX}
   \doi{XXX}
   \firstpage{80}
   \lastpage{94}
   \copyrightowner{N.~Parikh and S.~Boyd}
   ```

   These can be included before `\maketitle`. Default values will be used for these if they are not provided. Consult NOW for the ap-

propriate values for your paper; you should provide the copyright owner in the format given above.

3

Style Guidelines

In this chapter we outline guidelines that you should follow when preparing your document. This includes information on use of TEX [Knuth and Bibby, 1986] and LATEX [Lamport, 1994] themselves, as well as style guidelines for Foundations and Trends journals in particular.

3.1 Bibliography

Use a BiBTEX file as usual and set the bibliography style to `plain` or `plainnat` as needed for the particular journal you are writing for.

3.2 Referring to your paper

Your paper is being published in multiple formats (such as a book and a journal article), so you should avoid terms such as "book", "article", and "paper" when referring to the work itself. Instead, please use terms such as "monograph", "tutorial", "review", or "survey".

3.3 Titles

Capitalize the first letter of all words of chapter titles (except for filler words like 'the' and 'and', of course). You should capitalize words appearing in hyphenated constructions, as in Interior-Point Methods. For all other titles (sections, subsections, subsubsections, paragraphs), capitalize only the first letter and any proper nouns, as in this document.

You may prefer a different capitalization scheme, for example, capitalizing all words in section titles as well. This is fine, but be sure that you are absolutely consistent in your scheme.

3.4 References

When referring to sections (chapters, appendices) using `\ref`, refer to chapters as Chapter 5 but sections as §5.1. To produce the section symbol, use `\S`. When referring to tables or figures, write Table 7.1 or Figure 5.3. When referring to equations, write simply (3.4) or Equation 3.4. The former can be more easily obtained using `\eqref{}` from the `amsmath` package (not included by the NOW class itself).

3.5 Preface and other special chapters

If you want to include a preface, it should be defined as follows:

```
\chapter*{Preface}
\addcontentsline{toc}{chapter}{Preface}
\markboth{\sffamily\slshape Preface}
  {\sffamily\slshape Preface}
```

This ensures that the preface appears correctly in the table of contents and the running headings.

You can follow a similar procedure if you want to include additional unnumbered chapters (*e.g.*, a chapter on notation used in the paper), though all such chapters should precede Chapter 1.

Unnumbered chapters should not include numbered sections. If you want to break your preface into sections, use the starred versions of `section`, `subsection`, *etc.*

3.6 Figures and plots

Don't use the optional positioning commands in figures, tables, etc. Make caption text consistent in syntax and style.

3.7 Mathematics

Be consistent in formatting equations and make sure they are consistent with the surrounding English syntax. As an example:

When $\theta > 0$, we have

$$\theta + \theta^2 > \theta.$$

Note the comma after the fragment '$\theta > 0$' and the period after the displayed inequality. The sentence starts with the English word 'When' and ends with the displayed equation. (By the way, many authors have adopted the convention that a sentence should always start in English, and not with a mathematical formula or equation.)

Be sure to distinguish mathematics from English, even in sub- and super-scripts. For example, do not write $sin(\theta)$, which typesets 'sin' as three mathematical symbols next to each other; the correct version is $\sin(\theta)$. As a more subtle example, consider

$$\theta_i \leq \theta^{\max}, \quad i = 1, \ldots, K.$$

Here the superscript 'max' is correctly rendered in roman font, since it refers to the English word 'max' or 'maximum'. The wrong way is to write $\theta_i \leq \theta^{max}$.

In general, mathematics should be typeset using built-in mathematical commands like `\sin`, variables should be typeset in math mode, and English in math mode should be typeset in standard roman font. Combining these, we get, for example, $\sin(x^n + x^{\max})$.

3.8 Source code

We recommend that you hard wrap your LaTeX source to, say, 72 characters or equivalent, and that you put display mathematical equations

in a paragraph on their own line. See the source code of this document itself for an example. This is to make the source code both easier to read and easier to debug. If you have entire paragraphs on a single line, it can become difficult to track down LaTeX compilation errors when it complains about a given line.

3.9 Making the output look good

You may be tempted to fine-tune the LaTeX source to attempt to make the output look good by, say, forcing a line break or a page break at a good place, or by adding or subtracting vertical or horizontal space in the document. Our advice on this is simple:

Never do this.

Never adjust the LaTeX source to make the output look better. Keep your LaTeX source completely free of commands that adjust the particular output using custom spacing or positioning commands. Leave this task to TeX and LaTeX.

Of course, tables and figures that are clearly too large to fit in the margins should be appropriately shrunk, either by reducing the font size or by breaking up the table to use fewer columns. Another example is a long URL which wreaks havoc on the typesetting; you can put these on a line by themselves.

The *only exception* to this important rule is on the very last pass, right before your article goes into production; see Appendix C.

Acknowledgements

We would like to thank Donald Knuth and Leslie Lamport for their work on TEX and LATEX, respectively, as well as the many others who have developed the LATEX packages we rely on for our own work.

Appendices

A

Bare Bones File Outline

```
\documentclass{now}

\title{Article Title}

\author{
Neal Parikh \\
Stanford University \\
npparikh@cs.stanford.edu
\and
Stephen Boyd \\
Stanford University \\
boyd@stanford.edu
}

\begin{document}

% \firstpage, \doi, etc. as needed

\frontmatter
```

```
\maketitle

\tableofcontents

\mainmatter

\begin{abstract}
The abstract goes here.
\end{abstract}

\chapter{Introduction}
This is the text for the first chapter.

\chapter{Conclusion}
The text for the last chapter goes here.

\begin{acknowledgements}
Don't forget to thank your mom, without whom your article
would not have been possible.
\end{acknowledgements}

\appendix

\chapter{First Appendix}
This is an appendix with many technical details, or
a summary of other needed material.

\backmatter

\bibliographystyle{plain} % or plainnat
\bibliography{mybibfile}
```

B

Sample Formatting

In this chapter, we illustrate various environments that are available to the author. See the source code of this document itself to see how to produce this display. You can define your own additional environments using the usual `amsthm` procedure, but you should not customize the theorem style; the theorem style will automatically use the NOW one.

B.1 Theorem environments

Definition B.1 (contraction mapping)**.** Let (X, d) be a metric space. Then a map $T : X \to X$ is called a *contraction mapping* on X if there exists $q \in [0, 1)$ such that

$$d(T(x), T(y)) \leq qd(x, y)$$

for all $x,\ y$ in X.

Theorem B.1 (Banach fixed point theorem)**.** Let (X, d) be a non-empty complete metric space with a contraction mapping $T : X \to X$. Then T admits a unique fixed-point x^* in X (*i.e.*, $T(x^*) = x^*$). Furthermore, x^* can be found as follows: start with an arbitrary element x_0 in X and define a sequence x_n by $x_n = T(x_{n-1})$, then $x_n \to x^*$.

Proof. Lorem ipsum dolor sit amet, consectetur adipiscing elit. Mauris non metus et lorem euismod ullamcorper vel at justo. Curabitur dignissim dui eget suscipit facilisis. Sed odio dolor, laoreet at tempus auctor, rhoncus ac lorem. Etiam ac nibh lobortis, vehicula urna lacinia, aliquam quam. □

Lemma B.2. Lorem ipsum dolor sit amet, consectetur adipiscing elit. Mauris non metus et lorem euismod ullamcorper vel at justo. Curabitur dignissim dui eget suscipit facilisis. Etiam ac nibh lobortis, vehicula urna lacinia, aliquam quam.

Corollary B.3. Lorem ipsum dolor sit amet, consectetur adipiscing elit. Mauris non metus et lorem euismod ullamcorper vel at justo. Curabitur dignissim dui eget suscipit facilisis. Etiam ac nibh lobortis, vehicula urna lacinia, aliquam quam.

Remark B.1. Lorem ipsum dolor sit amet, consectetur adipiscing elit. Mauris non metus et lorem euismod ullamcorper vel at justo. Curabitur dignissim dui eget suscipit facilisis. Etiam ac nibh lobortis, vehicula urna lacinia, aliquam quam.

Proposition B.1. Lorem ipsum dolor sit amet, consectetur adipiscing elit. Mauris non metus et lorem euismod ullamcorper vel at justo. Curabitur dignissim dui eget suscipit facilisis. Etiam ac nibh lobortis, vehicula urna lacinia, aliquam quam.

Example B.1. Lorem ipsum dolor sit amet, consectetur adipiscing elit. Mauris non metus et lorem euismod ullamcorper vel at justo. Curabitur dignissim dui eget suscipit facilisis. Etiam ac nibh lobortis, vehicula urna lacinia, aliquam quam.

B.2 Internet addresses

The NOW class file includes the `url` package, so you should wrap email and web addresses with `\url{}`. This will also make these links clickable in the PDF.

C

Fine-Tuning

Remember that you should generally never fine-tune your LaTeX source to make the output look good; see §3.9 on page 9. This appendix describes the *only time* when you can and should fine-tune your source. Before proceeding, be sure that these are the very last adjustments to be made to your LaTeX source before the article appears.

C.1 Positioning floats

You may need to alter the positioning information for floating environments such as tables and figures. In general, tables and figures with captions should appear at the top of the page. Unless a figure is large enough to take up most of a page, it should not appear on a page by itself. If you want to force, say, two figures to appear one on top of each other on their own page, you can use the following code or equivalent:

```
\begin{figure}[p]
\begin{center}
\includegraphics{figure_one}
\end{center}
\label{f-one}
```

```
\caption{Figure One.}
\begin{center}
\includegraphics{figure_two}
\end{center}
\label{f-two}
\caption{Figure Two.}
\end{figure}
```

An alternative is to use the `subfigure` package.

Again, you should generally *not* modify the placement of figures and tables. This should be done only when really necessary and then only in the last pass over a document, right before it goes into production.

C.2 Pagination

By and large, pagination is very well-handled by default by TEX's typesetting algorithms. In some cases, however, the typesetting engine requires some help to do the right thing. This can even involve rewriting specific parts of the text of the article.

Bringhurst [Bringhurst, 2012, §2.4] suggests[1] the following guidelines:

> *Avoid leaving the end of a hyphenated word, or any word shorter than four letters, as the last line of a paragraph.*
>
> *Never begin a page with the last line of a paragraph.*
>
> The typographic terminology is telling. The stub-ends left when paragraphs *end* on the *first* line of a page are called *widows*. They have a past but not a future, and they look foreshortened and forelorn. It is the custom to give them one additional line for company. This rule is applied in close conjunction with the next.

Fixing such issues often involves rewriting some sentences in the relevant paragraph or preceding paragraphs. They should typically not be addressed with manual page breaks or other forced typesetting.

[1] We have slightly edited the raw text for brevity.

C.3 Long chapter and section names

If you have a very long chapter or section name, it may not appear nicely in the table of contents, running heading, document body, or some subset of these. It is possible to have different text appear in all three places if needed using the following code:

```
\chapter[Table of Contents Name]{Body Text Name}
\chaptermark{Running Heading Name}
```

Sections can be handled similarly using the `sectionmark` command instead of `chaptermark`.

For example, the full name should always appear in the table of contents, but may need a manual line break to look good. For the running heading, an abbreviated version of the title should be provided. The appearance of the long title in the body may look fine with LaTeX's default line breaking method or may need a manual line break somewhere, possibly in a different place from the contents listing.

Long titles for the article itself should be left as is, with no manual line breaks introduced. The article title is used automatically in a number of different places by the class file, and manual line breaks will interfere with the output. If you have questions about how the title appears in the front matter, please contact NOW.

References

R. Bringhurst. *The Elements of Typographic Style*. Hartley & Marks: Vancouver, BC, fourth edition, 2012.

D. E. Knuth and D. Bibby. *The TEXbook*. Addison-Wesley: Reading, MA, 1986.

L. Lamport. *LATEX: A Document Preparation System*. Addison-Wesley, second edition, 1994.